

CLAIMS

1. An anti-microbial composition comprising (i) a first compound having a high surface tension of from 20 to 35 mN/m, (ii) a second compound having a low surface tension of from 8 to 14 mN/m, (iii) a first anti-microbial agent and (iv) a polar solvent, wherein composition acts substantially to prevent the formation of microbial colonies on or at a surface of the composition.
2. An anti-microbial composition according to Claim 1, wherein the surface tension of the second compound is 10 mN/m.
3. An anti-microbial composition according to Claim 1 or 2, wherein the first compound is hydrophobic.
4. An anti-microbial composition according to any one of the preceding claims, wherein the second compound is hydrophilic.
5. An anti-microbial composition according to any one of the preceding claims, wherein the first compound is a second anti-microbial agent.
6. An anti-microbial composition according to any one of the preceding claims, wherein the first and/or second anti-microbial agent is of a polar nature.
7. An anti-microbial composition according to any one of the preceding claims, comprising at least one anti-microbial agent selected from bacteriocidal, fungicidal, algicidal, yeasticidal and moldicidal agents.
8. An anti-microbial composition according to claim 7, comprising at

least one anti-microbial agent selected from bacteriocidal, fungicidal and moldicidal agents.

9. An anti-microbial composition according to any one of claims 5 to 8, wherein the second anti-microbial agent is a quaternary ammonium compound.

10. An anti-microbial composition according to any one of the preceding claims, comprising at least one first anti-microbial agent selected from amphoteric compounds, iodophores, phenolic compounds, quaternary ammonium compounds, hypochlorites and nitrogen based heterocyclic compounds.

11. An anti-microbial composition according to Claim 9 or 10, wherein the or each quaternary ammonium compound has the general formula $R^1R^2R^3R^4N^+X^-$, in which one or two of the R groups are alkyl, optionally substituted by aryl or optionally interrupted by aryl or a heteroatom, and the other R groups are the same or different and are C_1 to C_4 alkyl groups.

12. An anti-microbial composition according to Claim 11, wherein the quaternary ammonium compound is selected from a benzalkonium halide, an aryl ring substituted benzalkonium halide and a dialkyldimethyl ammonium compound wherein the two non-methyl alkyl groups are selected from C_8 to C_{12} alkyl.

13. An anti-microbial composition according to Claim 12, wherein the quaternary ammonium compound is selected from benzenethanaminium N-dodecyl-N,N-dimethylchloride, benzenethanaminium N-dodecyl-N,N-dimethyl-N-tetradecylchloride and benzyl- C_{12} - C_{16} -alkyldimethyl-ammoniumchloride.

14. An anti-microbial composition according to Claim 10, wherein the or each amphoteric compound is a long-chain N-alkyl derivative of an amino acid.
- 5 15. An anti-microbial composition according to Claim 14, wherein the amphoteric compound is selected from a long chain N-alkyl derivative of glycine, alanine and beta-amino butyric acid.
- 10 16. An anti-microbial composition according to Claim 15, wherein the amphoteric compound is selected from dodecyl beta-alanine, dodecyl beta-aminobutyric acid, dodecylamino-di(aminoethylamino)glycine and N-(3-dodecylamino)propylglycine.
- 15 17. An anti-microbial composition according to Claim 10, wherein the each iodophore is selected from a complex of iodine or triiodine with polyvinylpyrrolidone, a polyether glycol, a polyvinyl alcohol, a polyacrylate, a polyamide, a polyalkylene and a polysaccharide.
- 20 18. An anti-microbial composition according to Claim 10, wherein the or each phenolic compound is selected from a methyl, ethyl, butyl, halo and aryl substituted phenol.
- 25 19. An anti-microbial composition according to Claim 18, wherein the phenolic compound is selected from 2-phenylphenol, 2-benzyl-4-chlorophenol, 2-cyclopentanol-4-chlorophenol, 4-t-amylphenol, 4-t-butylphenol, 4-chloro-2-pentylphenol, 6-chloro-2-pentylphenol, p-chloro-meta-xyleneol, 2,4,4-trichloro-2-hydroxydiphenol, thymol, 2-i-propyl-3-methylphenol, chlorothymol, 3-methyl-4-chlorophenol, 2,6-dichloro-4-n-alkyl phenols, 2,4-dichloro-meta-xyleneol, 2,4,6-trichlorophenol and 2-30 benzyl-4-chlorophenol.

20. An anti-microbial composition according to Claim 10, wherein the or each hypochlorite is selected from a hypochlorite of an alkali metal and an alkaline earth metal.

5 21. The anti-microbial composition according to Claim 20, wherein the hypochlorite is selected from a hypochlorite of lithium, sodium, potassium and calcium.

10 22. An anti-microbial composition according to Claim 20 or 21 wherein the hypochlorite is a chlorinated trisodium phosphate or a hydrate thereof.

23. An anti-microbial composition according to Claim 20 or 21, wherein the hypochlorite is selected from chlorine dioxide or a precursor thereof, N,N-dichloro-4-carboxybenzenesulphonamide, 1,3-dichloro-5,5-dimethylhydantoin and a derivative of chloroisocyanuric acid.

15 24. An anti-microbial composition according to Claim 10, wherein the or each nitrogen based heterocyclic compound is selected from a pyridine derivative, a triazole, a thiazole and an imidazole.

20 25. An anti-microbial composition according to Claim 24, wherein the nitrogen based heterocyclic compound is selected from 4-pyridine carboxylic acid hydrazide, sodium 2-pyridinethiol and bis-(2-pyridylthio)zinc-1,1-dioxide.

25 26. A composition according to any preceding claim, wherein the anti-microbial agent is selected from benzenethanaminium N-dodecyl-N,N-dimethylchloride, benzenethanaminium N-dodecyl-N,N-dimethyl-N-tetradecylchloride, benzyl-C₁₂-C₁₆-alkyldimethyl-ammoniumchloride, 2-phenyl phenol, 2-octyl-2H-isothiazol-3-one, 5-chloro-2-methyl-2H-

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isothiazol-3-one and 2-methyl-2H-isothiazol-3-one.

27. An anti-microbial composition according to any one of the preceding claims, wherein the second compound is a C₁₂ to C₂₀ surfactant or oil.

28. An anti-microbial composition according to Claim 27, wherein the second compound is selected from a silane, polysiloxane, polyethylene glycol, sodium lauryl sulphate and soya lecathin.

29. An anti-microbial composition according to Claim 28, wherein the second compound is polydimethylhydroxysiloxane.

30. An anti-microbial composition according to any one of the preceding claims, comprising from 1 to 4 % by volume of the second compound.

31. An anti-microbial composition according to any one of the preceding claims, wherein the polar solvent is selected from water, an alcohol, an ester, a hydroxy or glycol ester, a polyol and a ketone.

32. An anti-microbial composition according to Claim 31, wherein the polar solvent is selected from isopropanol, diethylene glycol and dipropylene glycol.

33. An anti-microbial composition according to any one of the preceding claims, comprising from 1 to 70 % by volume of the polar solvent.

34. An anti-microbial composition according to any one of the preceding claims, wherein the composition comprises 32% by volume of a mixture of benzenethanaminium N-dodecyl-N,N-dimethylchloride and benzenethanaminium N-dodecyl-N,N-dimethyl-N-tetradecyl-chloride

5 (2.33:1), 6.0% by volume of a mixture of benzyl-C₁₂-C₁₆-alkyldimethyl-ammoniumchloride and 2-phenyl phenol (2:1), 6.0 % by volume 2-octyl-2H-isothiazol-3-one, 16.0 % by volume of a mixture of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1), 1.0% by volume a blend of polysiloxanes and 39% by volume isopropanol.

10 35. An anti-microbial composition according to any one of the preceding claims, wherein the composition comprises 32% by volume of a mixture of benzenethanaminium N-dodecyl-N,N-dimethylchloride and benzenethanaminium N-dodecyl-N,N-dimethyl-N-tetradecyl-chloride (2.33:1), 6.0% by volume of a mixture of benzyl-C₁₂-C₁₆-alkyldimethyl-ammoniumchloride and 2-phenyl phenol (2:1), 6.0 % by volume 2-octyl-2H-isothiazol-3-one, 16.0 % by volume of a mixture of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1), 1.0% by
15 volume of polydimethylhydroxysiloxane and 39% by volume isopropanol.

36. A formulation comprising the anti-microbial composition according to any one of the preceding claims and a functional material.

20 37. A formulation according to Claim 36, wherein the functional compound is selected from plastics, fibres, coatings, films, laminates, adhesives, sealants, clays, china, ceramics, concrete, sand, paints, varnishes, lacquers, cleaning agents and settable or curable compositions such as fillers, grouts, mastics and putties.

25 38. A formulation according to Claim 36 or 37, wherein the formulation comprises from 0.1 to 5.0 % by weight of the anti-microbial composition.

30 39. A formulation according to Claim 38, wherein the formulation comprises from 0.5 to 2.0 % by weight of the anti-microbial composition.

40. The use of an anti-microbial composition according to any one of Claims 1 to 35, to prevent the formation of colonies of microorganisms on a surface at which it is provided.

5 41. The use of a formulation according to any one of Claims 36 to 39, to prevent the formation of colonies of microorganisms on a surface at which it is provided.

10 42. A method of manufacturing an anti-microbial composition according to any one of Claims 1 to 35, the method comprising the steps of (i) mixing the first compound and the first anti-microbial agent together, (ii) adding the second compound to the mixture of the first compound and the first anti-microbial agent, (iii) adding the polar solvent to the mixture of the first and second compounds and first anti-microbial agent and (iv) agitating the
15 resulting mixture until a clear solution is formed.

20 43. A method of manufacturing a formulation according to any one of Claims 36 to 39, the method comprising the step of adding the anti-microbial composition to the functional compound.

44. A composition generally as herein described.

25 45. A formulation comprising the anti-microbial composition generally as herein described.

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